

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-055304

(43)Date of publication of application : 26.02.1999

(51)Int.Cl.

H04L 12/44
H04L 12/46
H04L 12/28

(21)Application number : 09-212046

(71)Applicant : HITACHI CABLE LTD

(22)Date of filing : 06.08.1997

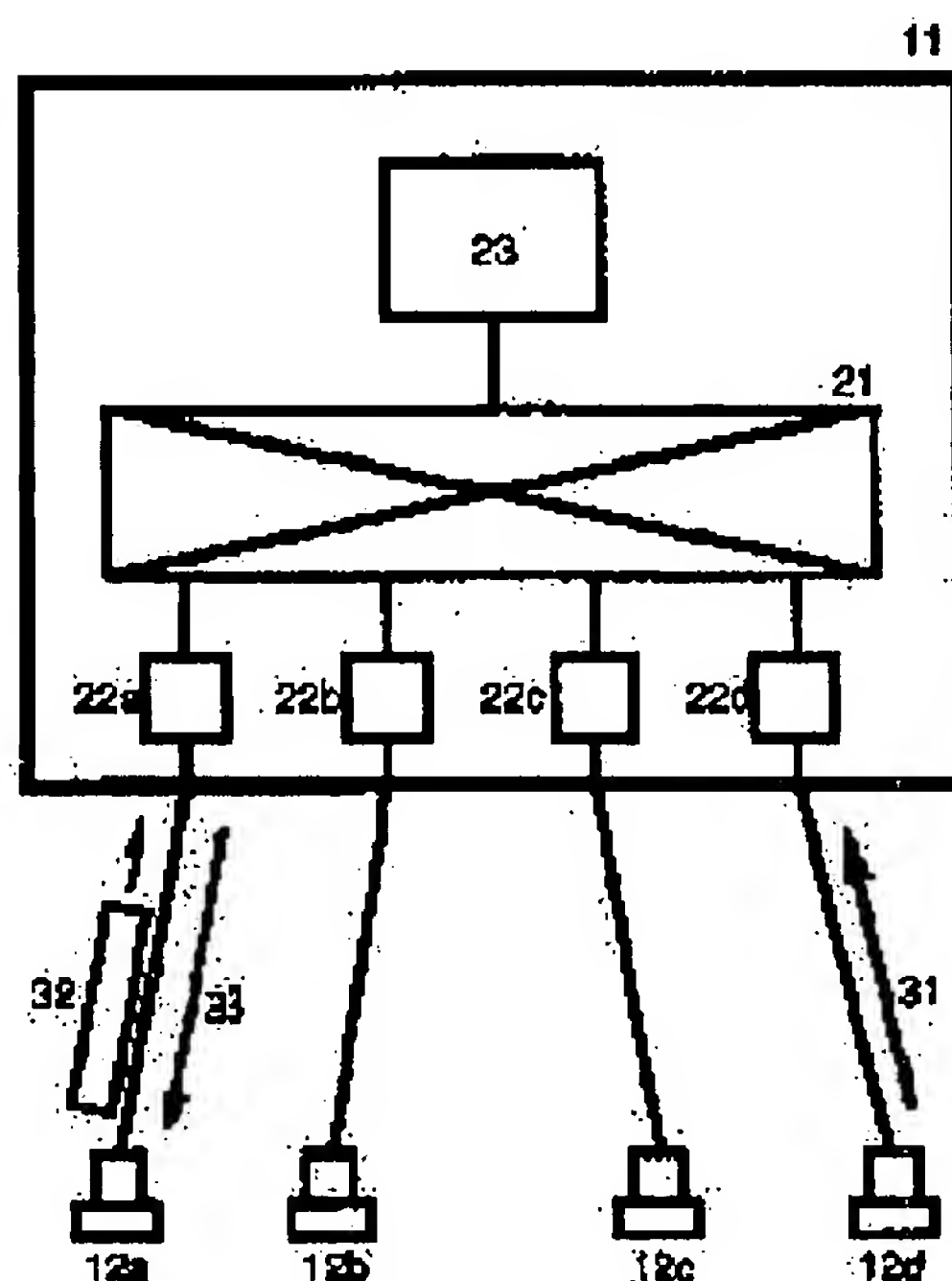
(72)Inventor : MIYAMOTO HIROAKI
HAYAMA HIROYUKI

(54) SWITCHING HUB

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a switching hub for operating flow control with high reliability and high transmission efficiency.

SOLUTION: This is a switching hub 11 having plural ports and a buffer 23 which temporarily preserves transfer data between ports. When data 32 from a terminal 12a to the destination of a terminal 12d are received during the stop of transmission to the terminal 12d according to a request from the terminal 12d, a transmission stop instruction 33 is issued to the terminal 12a being the origin of the transmission of the data. Thus, transmission from the terminal 12a is stopped so that the overflow of the buffer 23 can be prevented.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or

application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the switching hub which performs data transfer among two or more ports, and dependability is especially related with the switching hub which performs a high flow control with sufficient transmission efficiency.

[0002]

[Description of the Prior Art] A switching hub considers as the LAN device which can enlarge a network band easily, and attracts attention recently. As shown in drawing 6, Terminals 12a-12f are connected to each port of switching hubs 11a and 11b. Thus, by connecting switching hubs, it can consider as a system with a more large scale compared with the system by one switching hub.

[0003] A switching hub has two or more ports, looks at the destination of data, and relays data only to a required port. For example, two or more sets of communication links of 12d, 12e, and 12f [terminal 12a, 12b and 12c, and] can be performed to coincidence.

[0004] The interior of a switching hub is shown in drawing 7. The switching section 21 which exchanges data, the network interface sections 22a-22d of each port, and a buffer 23 are formed in the switching hub 11.

[0005] In a switching hub, the data of the same destination are received by coincidence, and when contention of transmission takes place, or when transmitting processing cannot immediately be carried out due to a throughput, data are saved at a buffer. When a buffer fills with the data of the waiting for transmission, captive **** of data occurs.

[0006] If an internal buffer fills without processing fulfilling demand due to a throughput although data are saved at a buffer when it has a buffer also at the terminal and data are received one after another, captive **** of data will occur.

[0007] In order to prevent captive **** of such data, the flow control which adjusts the amount of data which flows a network top to a proper value is needed.

[0008] The back pressure method is learned as a flow control in Ethernet. This method makes a collision situation intentionally with a jamming signal etc., and keeps a transmitting side waiting.

[0009] A back pressure method cannot be used in the full duplex Ethernet which can transmit and receive data to coincidence. For this reason, in IEEE802.3 committee which is standardizing Ethernet, the special frame for flow controls is defined in the specification of full duplex Ethernet.

[0010]

[Problem(s) to be Solved by the Invention] As shown in drawing 2, the case where 12d of terminals issues the transmitting stop instruction 31 to a switching hub 11 is considered. Since a switching hub 11 cannot be transmitted to 12d of terminals when the data 32 addressed to 12d of terminals are received from another port at this time, it stores data in a buffer 23. Thus, although data will be stored in a buffer 23 one after another when the data 32 addressed to 12d of terminals are received one after another, as the condition that data cannot be transmitted to 12d of terminals continues for a long time and it is shown in drawing 8 between them, finally a buffer 23 overflows and captive **** of received data

occurs.

[0011] Then, the purpose of this invention solves the above-mentioned technical problem, and dependability is to offer the switching hub which performs a high flow control with sufficient transmission efficiency.

[0012]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention has two or more ports, and if the data from other terminals are received by the addressing to a terminal when having suspended transmission to the terminal by the demand from a terminal, it will give transmitting stop instruction to the transmitting agency terminal of the data in a switching hub with the buffer which saves the transfer data between ports temporarily.

[0013] Moreover, it has two or more ports, and in a switching hub with the buffer which saves the transfer data between ports temporarily, if the data from other terminals are received by the addressing to a terminal when having suspended transmission to the terminal by the demand from a terminal, a jamming signal will be transmitted to the transmitting agency terminal of the data.

[0014]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained in full detail based on an accompanying drawing.

[0015] As shown in drawing 2, as for the switching hub 11, the network interface sections 22a-22d of two or more ports, the switching section 21 which exchanges the data between ports, and the buffer 23 which saves data temporarily are formed. The terminals 12a-12d connected to a switching hub 11 and each port can issue the transmitting halt command which suspends the data transmission from the other party to a mutual connection partner. A switching hub 11 will be in the transmitting idle state which suspends the transmission from the port where the terminal is connected, when a transmitting halt command is received from a terminal. Furthermore, if the data from other terminals are received by the addressing to a terminal, transmitting stop instruction will be given to the transmitting agency terminal of the data.

[0016] Here, the transmitting stop instruction 31 is taken out from 12d of terminals to a switching hub 11, and the case where terminal 12a transmits the data 32 addressed to 12d of terminals one after another in the condition of having suspended transmission to 12d of terminals from the switching hub 11 is considered.

[0017] As shown in drawing 1, since transmission to 12d of terminals is in a stopped condition when the data 32 addressed to 12d of terminals are received from terminal 12a, a switching hub 11 saves the data 32 at a buffer 23 temporarily, and gives the transmitting stop instruction 33 to it and coincidence to terminal 12a of the transmitting origin of data 32. Although terminal 12a tends to transmit the data 32 addressed to 12d of terminals one after another, when it receives the transmitting stop instruction 33, it suspends transmission. For this reason, it is lost after this that the data 32 addressed to 12d of terminals are received by the switching hub 11 from terminal 12a. Therefore, it is lost that a buffer 23 overflows with the data 32 received one after another.

[0018] Thus, since other one terminal transmitted data to addressing to a terminal which has suspended transmission one after another, the situation where a buffer 23 overflows will be avoided.

[0019] By the way, as shown in drawing 3, a switching hub 11 is in the condition of having suspended transmission to 12d of terminals according to the transmitting stop instruction 31 from 12d of terminals, when the data 32 addressed to 12d of terminals are received from terminal 12a, saves the data 32 at a buffer 23 temporarily, and gives the transmitting stop instruction 33 to it and coincidence to terminal 12a of a transmitting agency. Although terminal 12a suspended transmission by this, terminal 12b should transmit the data 32 addressed to 12d of terminals here. A switching hub 11 saves the data from terminal 12b at a buffer 23 temporarily, and issues transmitting stop instruction to terminal 12b of a transmitting agency. Furthermore, terminal 12c's transmission of the data 32 addressed to 12d of terminals also gives transmitting stop instruction to terminal 12c. Consequently, all the terminals 12a-12c that transmit the data addressed to 12d of terminals will be in a transmitting idle state.

[0020] Other operation gestalten of this invention explained below avoid that all terminals will be in a

transmitting idle state.

[0021] As shown in drawing 4, the address retrieval section 51 which a switching hub 11 registers the address of the network interface sections 22a-22d of two or more ports, the switching section 21 which exchanges the data between ports, the buffer 23 which saves data temporarily, and the terminal connected to the port, and the address of the terminal of a transmitting idle state, and is searched, and the jamming signal generating section 52 which generates a jamming signal and is sent out to a desired port are formed. The terminals 12a-12d connected to a switching hub 11 and each port can issue the transmitting halt command which suspends the data transmission from the other party to a mutual connection partner. A switching hub 11 will be in the transmitting idle state which suspends the transmission from the port where the terminal is connected, when a transmitting halt command is received from a terminal. Furthermore, when the address of the terminal made into the transmitting idle state is registered into the address retrieval section 51 and data are received, the address retrieval section 51 is searched, and if it is addressing to a terminal of a transmitting idle state, a jamming signal is sent out to the terminal which transmitted this data.

[0022] Here, the transmitting stop instruction 31 is taken out from 12d of terminals to a switching hub 11, and the case where terminal 12a transmits the data 32 addressed to 12d of terminals in the condition of having suspended transmission to 12d of terminals from the switching hub 11 is considered.

[0023] It is registered into the address retrieval section 51 that 12d of terminals is a transmitting idle state. As shown in drawing 5, if a switching hub 11 receives the data 32 addressed to 12d of terminals from terminal 12a, it searches the address retrieval section 51, gets to know that 12d of terminals is a transmitting idle state, cancels it, without storing data 32 in a buffer 23, and sends out a jamming signal 42 to terminal 12a from the jamming signal generating section 52. Terminal 12a which received this jamming signal 42 gets to know that transmission went wrong, and resends data 32. A switching hub 11 sends out a jamming signal 42 also to this resending data. IEEE802.3 committee has prescribed that resending of 10M Ethernet is 16 times. When resending exceeds 16 times, it will consider that transmission of the data is what went wrong completely, and it will stop transmission of the data. Therefore, terminal 12a stops transmission of the data 32 addressed to 12d of terminals, after trying resending 16 times. Thereby, terminal 12a becomes possible [performing transmission and reception with other terminals].

[0024] It is ** to which it is canceling a switching hub 11, without storing data, and sending out a jamming signal 42 to Terminals 12b and 12c similarly when other terminals 12b and 12c transmit the data addressed to 12d of terminals, and resending and a transmitting termination are urged. Each terminal stops transmission of the data addressed to 12d of terminals, after trying resending 16 times. Thereby, each terminal will become possible [performing transmission and reception with other terminals], and no terminals will be in a transmitting idle state.

[0025] Thus, since each of other terminal transmitted data to addressing to a terminal which has suspended transmission one after another, while the situation where a buffer 23 overflows is avoided, the situation where all terminals will be in a transmitting idle state will also be avoided.

[0026]

[Effect of the Invention] This invention demonstrates the outstanding effectiveness like a degree.

[0027] (1) Since a buffer stops overflowing, a reliable system can be built.

[0028] (2) Since the situation where all terminals will be in a transmitting idle state is avoided, a system with sufficient transmission efficiency can be built.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the switching hub which performs data transfer among two or more ports, and dependability is especially related with the switching hub which performs a high flow control with sufficient transmission efficiency.

[Translation done.]

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] A switching hub considers as the LAN device which can enlarge a network band easily, and attracts attention recently. As shown in drawing 6, Terminals 12a-12f are connected to each port of switching hubs 11a and 11b. Thus, by connecting switching hubs, it can consider as a system with a more large scale compared with the system by one switching hub.

[0003] A switching hub has two or more ports, looks at the destination of data, and relays data only to a required port. For example, two or more sets of communication links of 12d, 12e, and 12f [terminal 12a, 12b and 12c, and] can be performed to coincidence.

[0004] The interior of a switching hub is shown in drawing 7. The switching section 21 which exchanges data, the network interface sections 22a-22d of each port, and a buffer 23 are formed in the switching hub 11.

[0005] In a switching hub, the data of the same destination are received by coincidence, and when contention of transmission takes place, or when transmitting processing cannot immediately be carried out due to a throughput, data are saved at a buffer. When a buffer fills with the data of the waiting for transmission, captive **** of data occurs.

[0006] If an internal buffer fills without processing fulfilling demand due to a throughput although data are saved at a buffer when it has a buffer also at the terminal and data are received one after another, captive **** of data will occur.

[0007] In order to prevent captive **** of such data, the flow control which adjusts the amount of data which flows a network top to a proper value is needed.

[0008] The back pressure method is learned as a flow control in Ethernet. This method makes a collision situation intentionally with a jamming signal etc., and keeps a transmitting side waiting.

[0009] A back pressure method cannot be used in the full duplex Ethernet which can transmit and receive data to coincidence. For this reason, in IEEE802.3 committee which is standardizing Ethernet, the special frame for flow controls is defined in the specification of full duplex Ethernet.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] This invention demonstrates the outstanding effectiveness like a degree.

[0027] (1) Since a buffer stops overflowing, a reliable system can be built.

[0028] (2) Since the situation where all terminals will be in a transmitting idle state is avoided, a system with sufficient transmission efficiency can be built.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As shown in drawing 2 , the case where 12d of terminals issues the transmitting stop instruction 31 to a switching hub 11 is considered. Since a switching hub 11 cannot be transmitted to 12d of terminals when the data 32 addressed to 12d of terminals are received from another port at this time, it stores data in a buffer 23. Thus, although data will be stored in a buffer 23 one after another when the data 32 addressed to 12d of terminals are received one after another, as the condition that data cannot be transmitted to 12d of terminals continues for a long time and it is shown in drawing 8 between them, finally a buffer 23 overflows and captive **** of received data occurs.

[0011] Then, the purpose of this invention solves the above-mentioned technical problem, and dependability is to offer the switching hub which performs a high flow control with sufficient transmission efficiency.

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention has two or more ports, and if the data from other terminals are received by the addressing to a terminal when having suspended transmission to the terminal by the demand from a terminal, it will give transmitting stop instruction to the transmitting agency terminal of the data in a switching hub with the buffer which saves the transfer data between ports temporarily.

[0013] Moreover, it has two or more ports, and in a switching hub with the buffer which saves the transfer data between ports temporarily, if the data from other terminals are received by the addressing to a terminal when having suspended transmission to the terminal by the demand from a terminal, a jamming signal will be transmitted to the transmitting agency terminal of the data.

[0014]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained in full detail based on an accompanying drawing.

[0015] As shown in drawing 2, as for the switching hub 11, the network interface sections 22a-22d of two or more ports, the switching section 21 which exchanges the data between ports, and the buffer 23 which saves data temporarily are formed. The terminals 12a-12d connected to a switching hub 11 and each port can issue the transmitting halt command which suspends the data transmission from the other party to a mutual connection partner. A switching hub 11 will be in the transmitting idle state which suspends the transmission from the port where the terminal is connected, when a transmitting halt command is received from a terminal. Furthermore, if the data from other terminals are received by the addressing to a terminal, transmitting stop instruction will be given to the transmitting agency terminal of the data.

[0016] Here, the transmitting stop instruction 31 is taken out from 12d of terminals to a switching hub 11, and the case where terminal 12a transmits the data 32 addressed to 12d of terminals one after another in the condition of having suspended transmission to 12d of terminals from the switching hub 11 is considered.

[0017] As shown in drawing 1, since transmission to 12d of terminals is in a stopped condition when the data 32 addressed to 12d of terminals are received from terminal 12a, a switching hub 11 saves the data 32 at a buffer 23 temporarily, and gives the transmitting stop instruction 33 to it and coincidence to terminal 12a of the transmitting origin of data 32. Although terminal 12a tends to transmit the data 32 addressed to 12d of terminals one after another, when it receives the transmitting stop instruction 33, it suspends transmission. For this reason, it is lost after this that the data 32 addressed to 12d of terminals are received by the switching hub 11 from terminal 12a. Therefore, it is lost that a buffer 23 overflows with the data 32 received one after another.

[0018] Thus, since other one terminal transmitted data to addressing to a terminal which has suspended transmission one after another, the situation where a buffer 23 overflows will be avoided.

[0019] By the way, as shown in drawing 3, a switching hub 11 is in the condition of having suspended transmission to 12d of terminals according to the transmitting stop instruction 31 from 12d of terminals, when the data 32 addressed to 12d of terminals are received from terminal 12a, saves the data 32 at a

buffer 23 temporarily, and gives the transmitting stop instruction 33 to it and coincidence to terminal 12a of a transmitting agency. Although terminal 12a suspended transmission by this, terminal 12b should transmit the data 32 addressed to 12d of terminals here. A switching hub 11 saves the data from terminal 12b at a buffer 23 temporarily, and issues transmitting stop instruction to terminal 12b of a transmitting agency. Furthermore, terminal 12c's transmission of the data 32 addressed to 12d of terminals also gives transmitting stop instruction to terminal 12c. Consequently, all the terminals 12a-12c that transmit the data addressed to 12d of terminals will be in a transmitting idle state.

[0020] Other operation gestalten of this invention explained below avoid that all terminals will be in a transmitting idle state.

[0021] As shown in drawing 4, the address retrieval section 51 which a switching hub 11 registers the address of the network interface sections 22a-22d of two or more ports, the switching section 21 which exchanges the data between ports, the buffer 23 which saves data temporarily, and the terminal connected to the port, and the address of the terminal of a transmitting idle state, and is searched, and the jamming signal generating section 52 which generates a jamming signal and is sent out to a desired port are formed. The terminals 12a-12d connected to a switching hub 11 and each port can issue the transmitting halt command which suspends the data transmission from the other party to a mutual connection partner. A switching hub 11 will be in the transmitting idle state which suspends the transmission from the port where the terminal is connected, when a transmitting halt command is received from a terminal. Furthermore, when the address of the terminal made into the transmitting idle state is registered into the address retrieval section 51 and data are received, the address retrieval section 51 is searched, and if it is addressing to a terminal of a transmitting idle state, a jamming signal is sent out to the terminal which transmitted this data.

[0022] Here, the transmitting stop instruction 31 is taken out from 12d of terminals to a switching hub 11, and the case where terminal 12a transmits the data 32 addressed to 12d of terminals in the condition of having suspended transmission to 12d of terminals from the switching hub 11 is considered.

[0023] It is registered into the address retrieval section 51 that 12d of terminals is a transmitting idle state. As shown in drawing 5, if a switching hub 11 receives the data 32 addressed to 12d of terminals from terminal 12a, it searches the address retrieval section 51, gets to know that 12d of terminals is a transmitting idle state, cancels it, without storing data 32 in a buffer 23, and sends out a jamming signal 42 to terminal 12a from the jamming signal generating section 52. Terminal 12a which received this jamming signal 42 gets to know that transmission went wrong, and resends data 32. A switching hub 11 sends out a jamming signal 42 also to this resending data. IEEE802.3 committee has prescribed that resending of 10M Ethernet is 16 times. When resending exceeds 16 times, it will consider that transmission of the data is what went wrong completely, and it will stop transmission of the data. Therefore, terminal 12a stops transmission of the data 32 addressed to 12d of terminals, after trying resending 16 times. Thereby, terminal 12a becomes possible [performing transmission and reception with other terminals].

[0024] It is ** to which it is canceling a switching hub 11, without storing data, and sending out a jamming signal 42 to Terminals 12b and 12c similarly when other terminals 12b and 12c transmit the data addressed to 12d of terminals, and resending and a transmitting termination are urged. Each terminal stops transmission of the data addressed to 12d of terminals, after trying resending 16 times. Thereby, each terminal will become possible [performing transmission and reception with other terminals], and no terminals will be in a transmitting idle state.

[0025] Thus, since each of other terminal transmitted data to addressing to a terminal which has suspended transmission one after another, while the situation where a buffer 23 overflows is avoided, the situation where all terminals will be in a transmitting idle state will also be avoided.

[0026]

[Translation done.]

*** NOTICES ***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the data transmission diagram between the switching hubs and terminals by 1 operation gestalt of this invention.

[Drawing 2] It is a structure-of-a-system Fig. using the interior of a switching hub and the switching hub by 1 operation gestalt of this invention.

[Drawing 3] It is drawing showing the data transmission diagram between the switching hubs and terminals by 1 operation gestalt of this invention.

[Drawing 4] It is a structure-of-a-system Fig. using the interior of a switching hub and the switching hub by other operation gestalten of this invention.

[Drawing 5] It is drawing showing the data transmission diagram between the switching hubs and terminals by other operation gestalten of this invention.

[Drawing 6] It is a structure-of-a-system Fig. using a switching hub.

[Drawing 7] It is the internal configuration Fig. of a switching hub.

[Drawing 8] It is drawing showing the data transmission diagram between the switching hubs and terminals by the conventional technique.

[Description of Notations]

11 Switching Hub

12a, 12b, 12c, 12d Terminal

23 Buffer

32 Data

33 Transmitting Stop Instruction

42 Jamming Signal

[Translation done.]

* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The switching hub which will be characterized by giving transmitting stop instruction to the transmitting agency terminal of the data if the data from other terminals are received by the addressing to a terminal in a switching hub with the buffer which has two or more ports and saves the transfer data between ports temporarily when having suspended transmission to the terminal by the demand from a terminal.

[Claim 2] The switching hub which will be characterized by transmitting a jamming signal to the transmitting agency terminal of the data if the data from other terminals are received by the addressing to a terminal in a switching hub with the buffer which has two or more ports and saves the transfer data between ports temporarily when having suspended transmission to the terminal by the demand from a terminal.

[Translation done.]

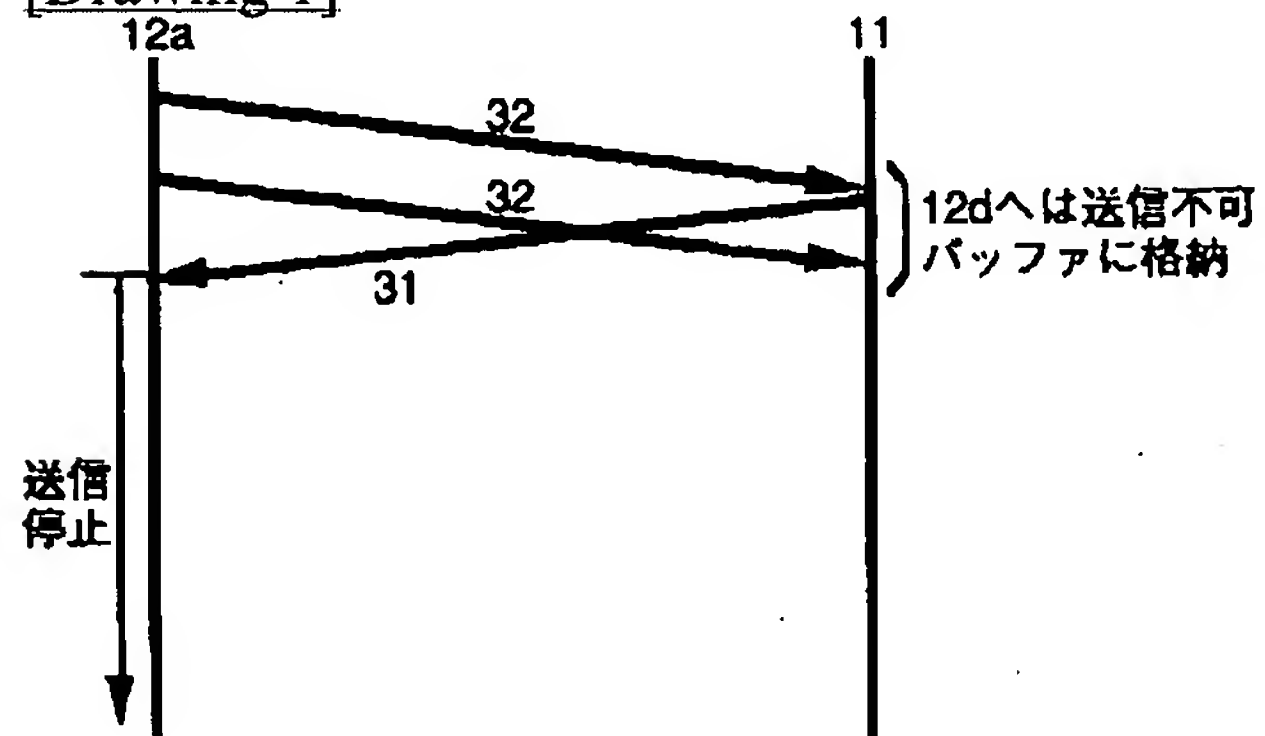
* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

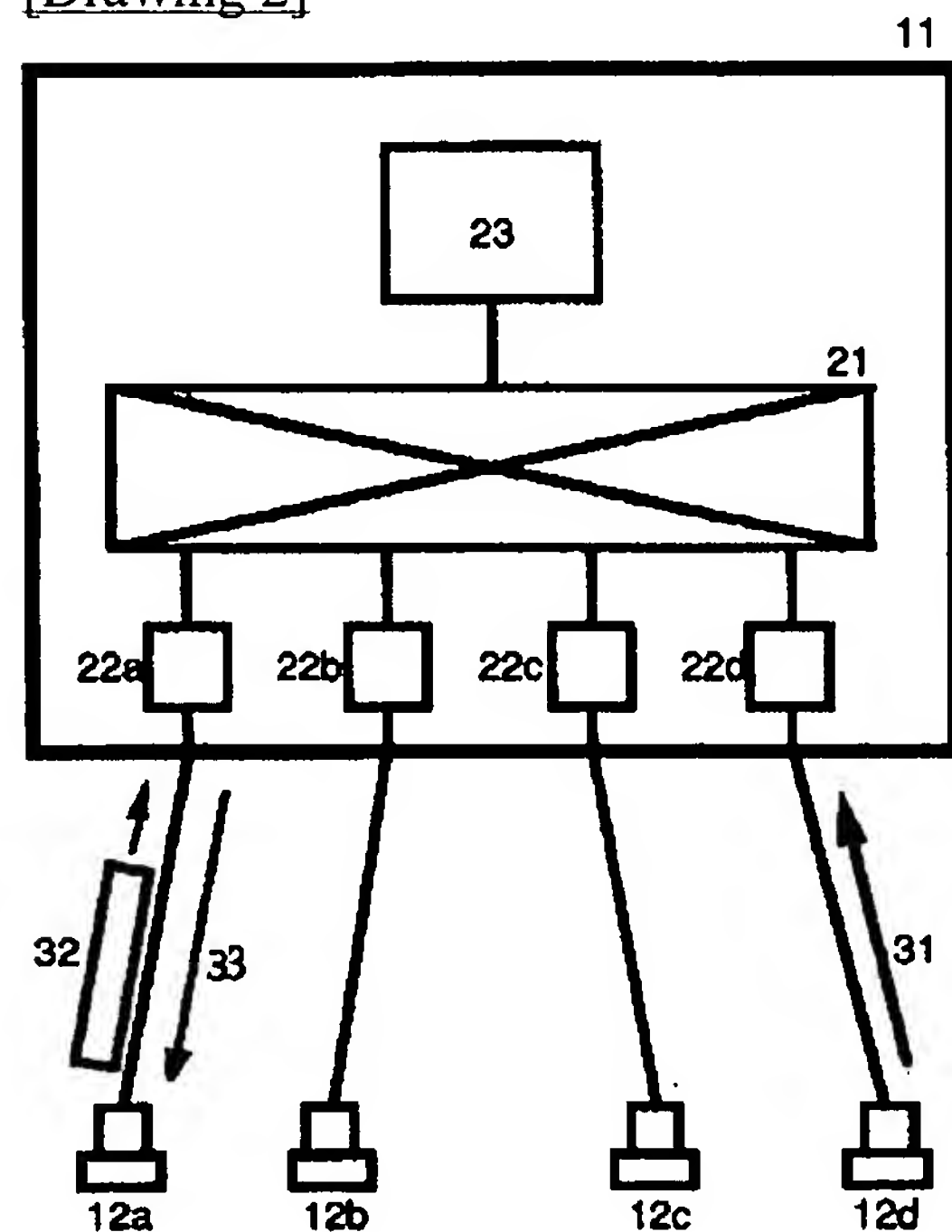
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

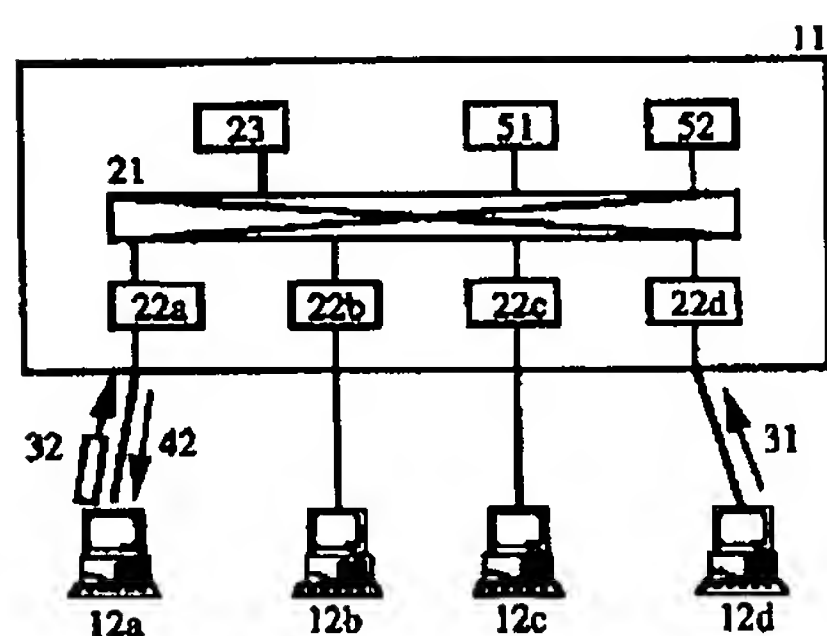
[Drawing 1]



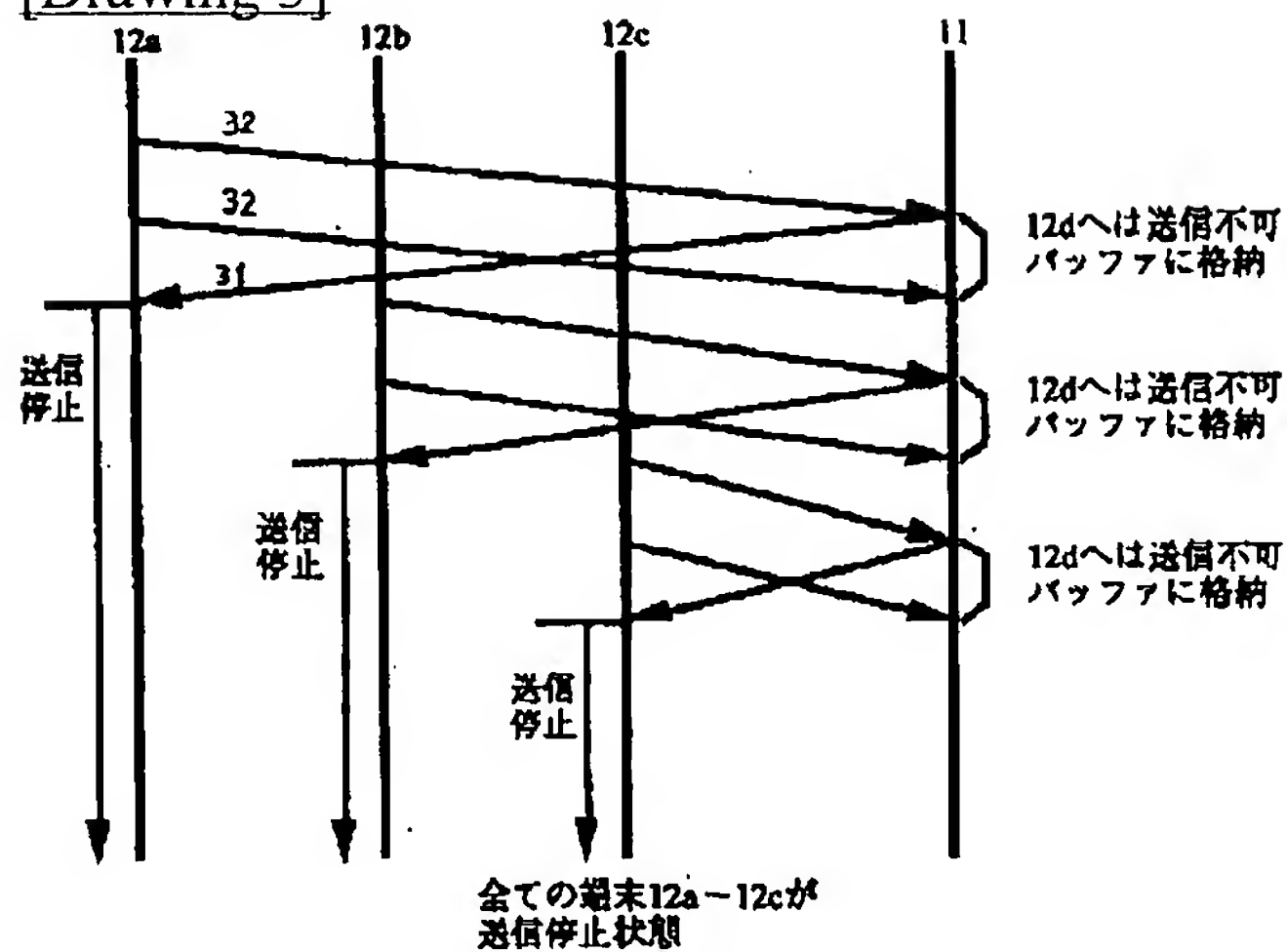
[Drawing 2]



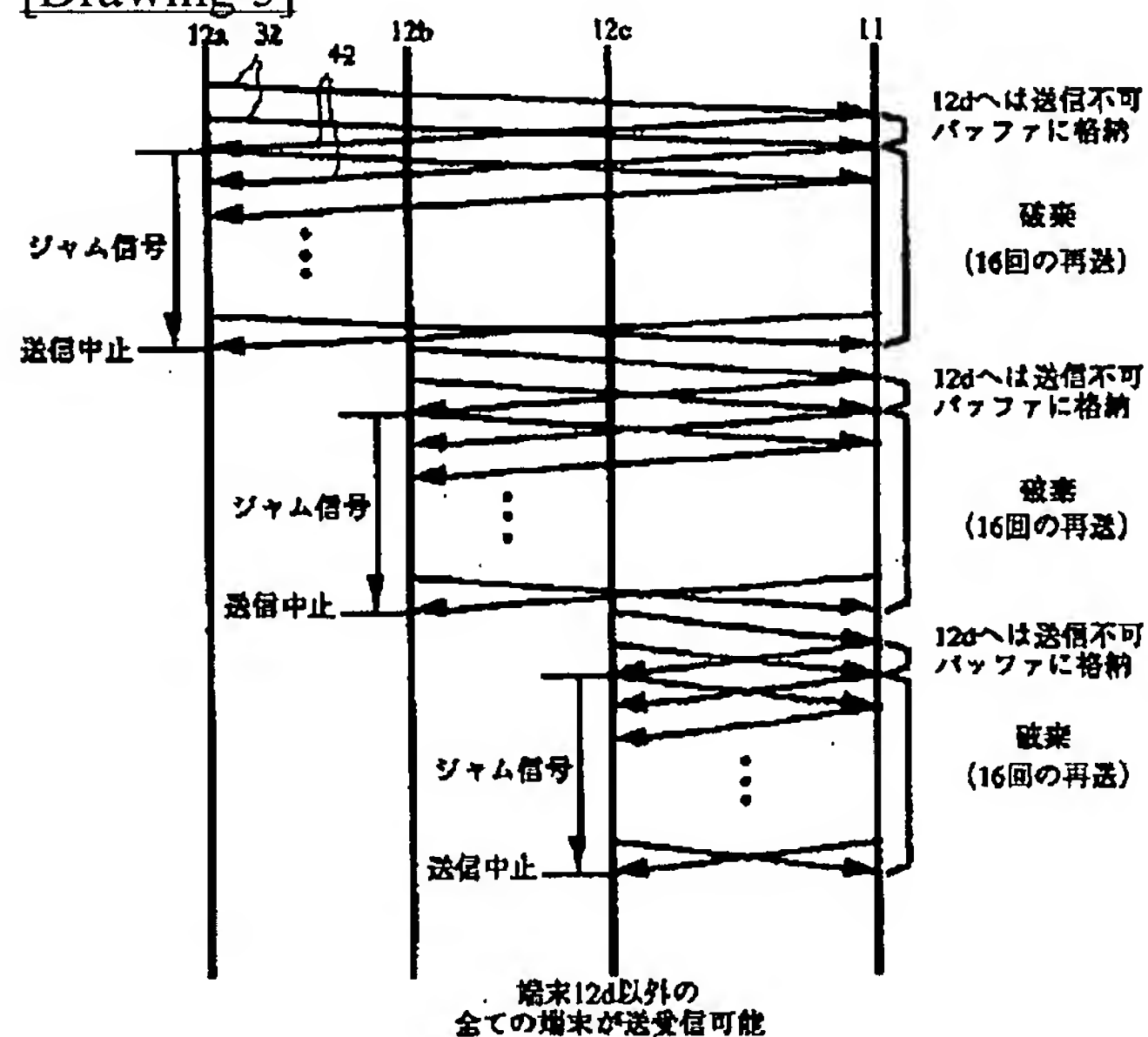
[Drawing 4]



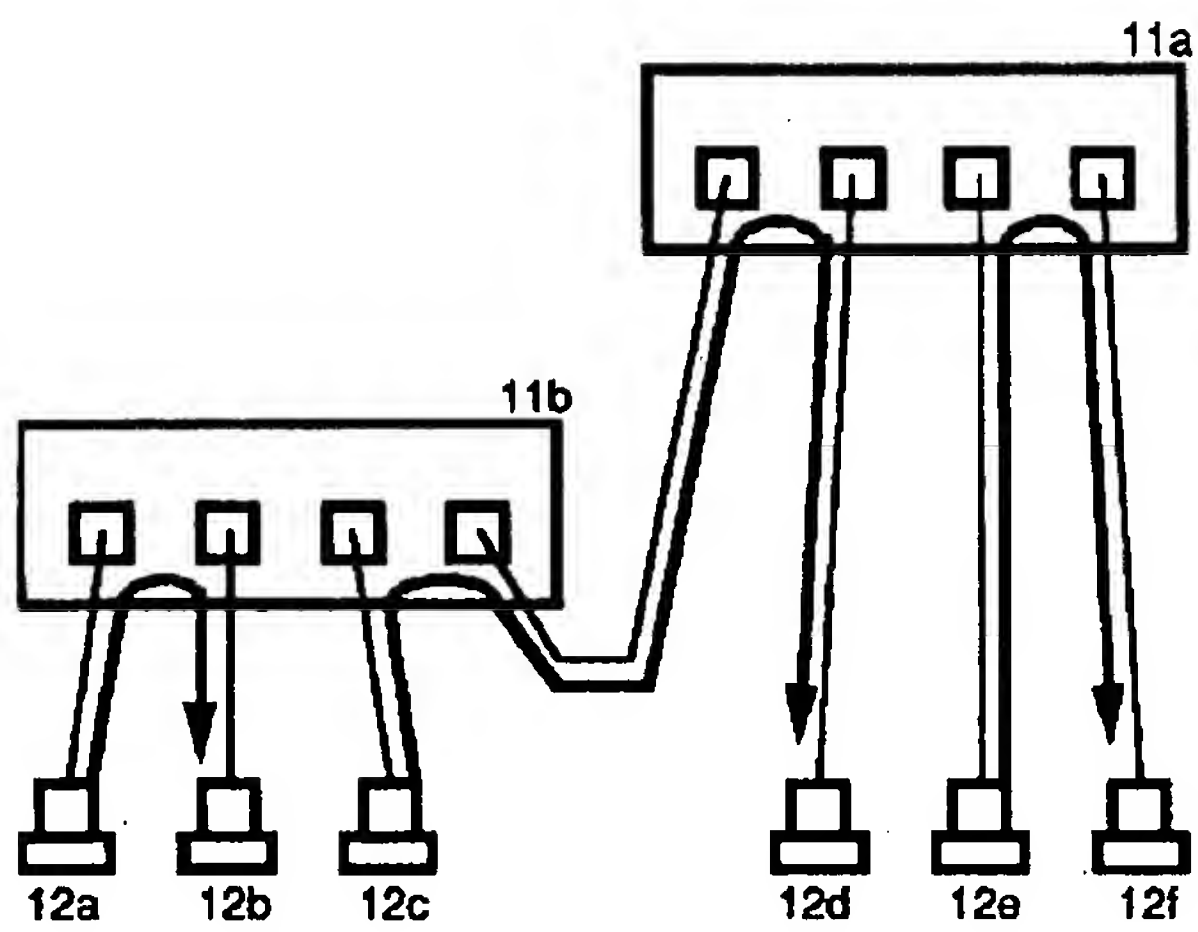
[Drawing 3]



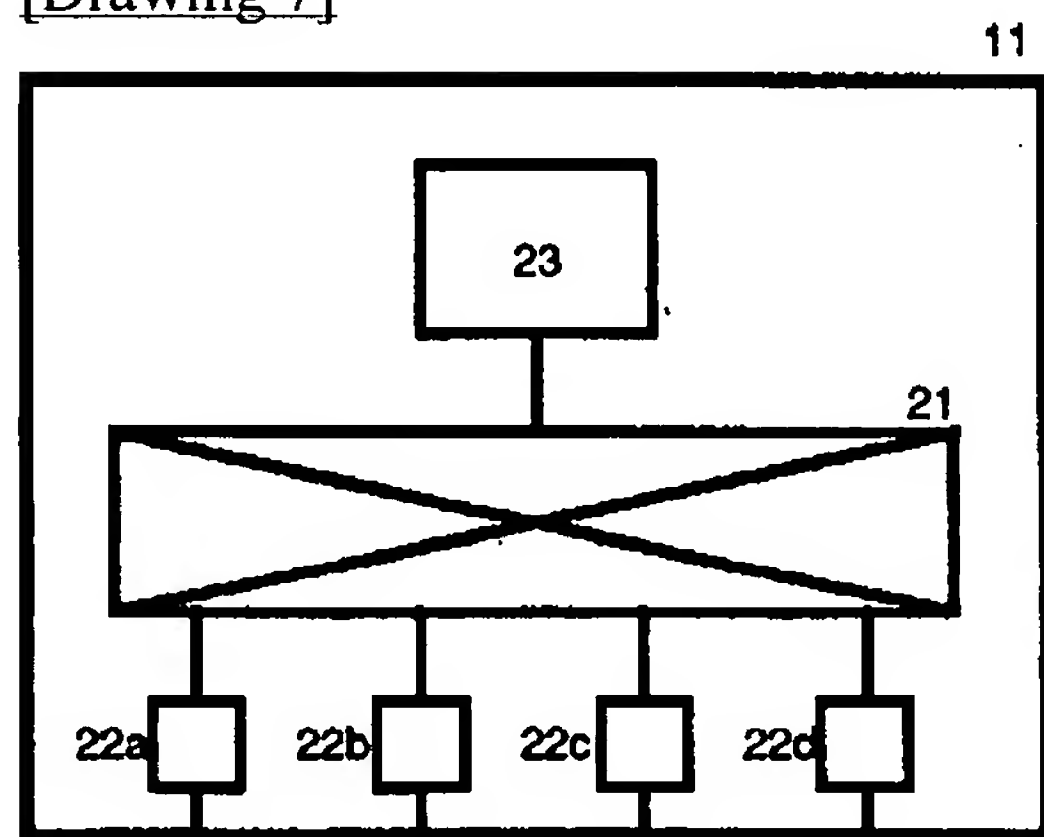
[Drawing 5]



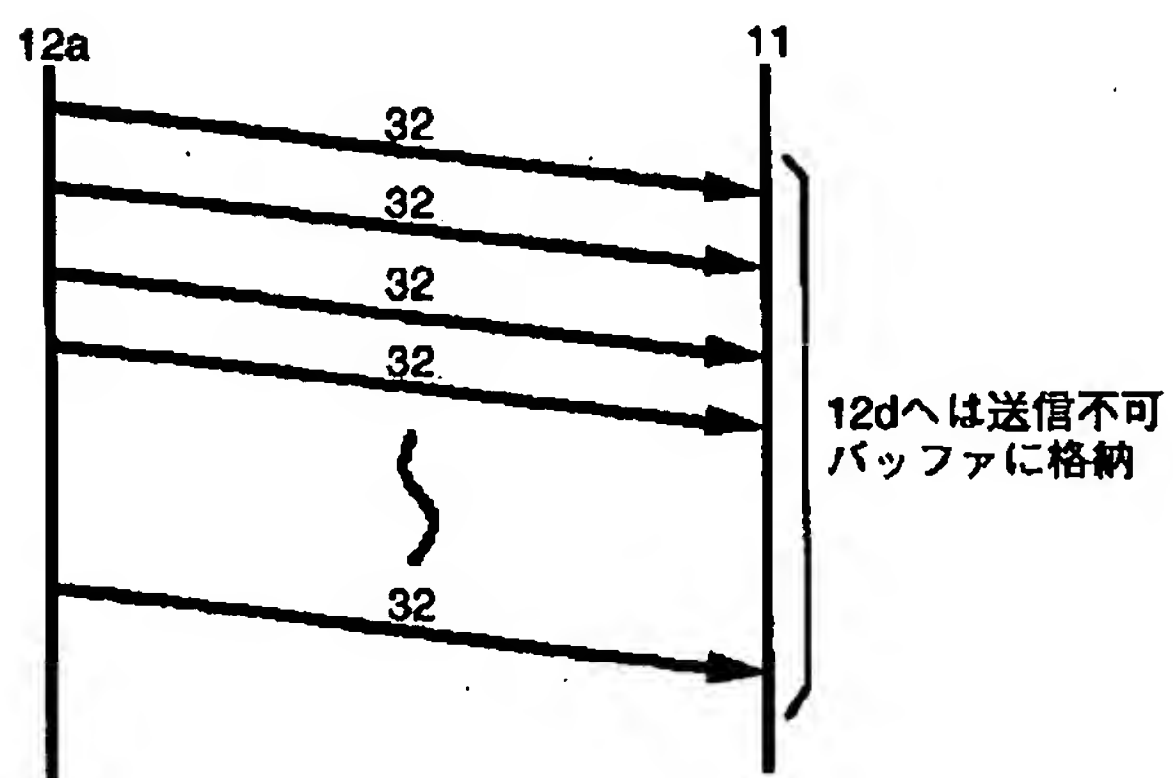
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]